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Lewis Research Center



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POLYIMIDE BONDED GRAPHITE FLUORIDE - A NEW LONG LIFE SOLID LUBRICANT COATING

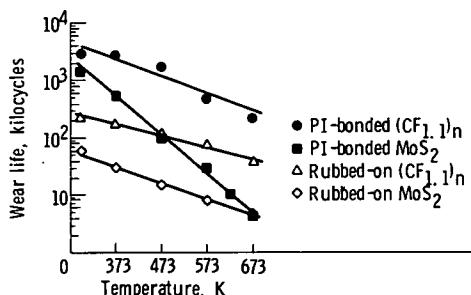


Figure 1. - Comparison of coating wear lives. Hemispherically-tipped rider of 1 kg on a rotating slider.

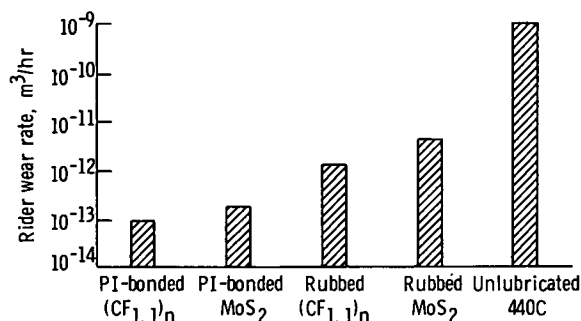


Figure 2. - Comparison of rider wear rates at 298 K.

A solid lubricant film consisting of polyimide (PI) varnish as the binder and graphite fluoride $(CF_{1.1})_n$ as the lubricant has been formulated and tested at temperatures from 298 to 673 K (77°F to 752°F) with excellent results.

Compared to three other solid lubricant films, the PI-bonded $(CF_{1.1})_n$ films had significantly longer wear life (Figure 1). For example, at 298 K (77°F) the wear life of PI-bonded $(CF_{1.1})_n$ was about twice that of PI-bonded molybdenum disulfide (MoS_2). As the temperature was increased, the difference in wear life also increased; at 673 K (752°F), the life of PI-bonded $(CF_{1.1})_n$ was greater by a factor of 60.

Figure 2 shows comparative wear rates for hemispherically-tipped riders sliding on disks coated with the four solid lubricant films tested. The lowest wear rates were obtained with the PI-bonded $(CF_{1.1})_n$ films.

The friction coefficients of all four films were in the range of 0.04 to 0.12. The exact value depended more upon the duration of the tests and the experimental conditions than upon the particular lubricant coating.

The specimen configuration used to evaluate the solid lubricant films consisted of a flat, rotating disc in sliding contact with a stationary hemispherically-tipped rider loaded to 1 kilogram. The wear was determined by measuring the circular scar diameter on the hemispherically-tipped rider and calculating the volume of the material removed from the rider.

A summary of all tests made has shown that the polyimide bonded graphite fluoride will provide a solid lubricant coating with long life and low wear rate.

NOTES:

- The following documentation may be obtained from:
National Technical Information Service
Springfield, Virginia 22151
Single document price \$3.00
(or microfiche \$0.95)
Reference: NASA TN-D-6714 (N72-18496),
Graphite Fluoride As A Solid Lubricant in a
Polyimide Binder
- Technical questions may be directed to:
Technology Utilization Officer
Lewis Research Center
21000 Brookpark Road
Cleveland, Ohio 44135
Reference: B72-10628

PATENT STATUS:

NASA has decided not to apply for a patent.

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Category 04